

REMARKS**Support for the Amendment**

The amendments to claim 44 are supported by page 13, lines 5-15 regarding the handle on the adhesion layer and in presently cancelled claims 45 and 46 with regard to removing the sacrificial layer and releasing the structural layer. The amendments to claim 54 are supported by presently cancelled claims 55 and 60 and on pages 5-6, lines 30-4 with regard to the sacrificial layer and on page 6, lines 17-24 regarding the layer materials. The amendments to claim 64 and for the new claims 71-74 and 76 are supported by page 6, lines 17-24 regarding the layer materials. Claim 75 is supported by page 14, lines 5-10 regarding the hook in the structural layer. No new matter has been added.

Status of the Claims

Claims 44, 47-54, 56-59, and 61-76 are pending. Claims 44, 54, 64, and 67 are amended. Claims 45, 46, 55, and 60 are cancelled without prejudice. Claims 69-76 are new.

Request for Reconsideration

Conventional SPM probe fabrication methods generally fabricated cantilever beams from silicon nitride or single crystal silicon while the tips were typically etched by wet or plasma etching. These methods are time-critical and inefficient, thus making it difficult to provide large arrays of tips with uniform sharpness.

In one aspect, the present invention may provide large arrays of tips with uniform sharpness because the sacrificial layer allows the substrate to be reused to form additional probes. In another aspect, claim 44 and the associated dependent claims provide a method of fabricating an SPM probe where a handle is formed on an adhesion layer. In another aspect, claims 54, 64, and the associated dependent claims provide methods of forming SPM probes and SPM

probes having cantilevers having beams and tips made from different materials. In another aspect, claims 70, 72, and the associated dependent claims provide methods of forming SPM probes and SPM probes having cantilevers having beams and tips made from materials that could not be utilized in conventional methods.

The Claims are Not Anticipated by or Obvious Over the Cited Art

The rejection of the claims as being anticipated by US 6,291,140 ("*Andreoli*") or obvious over US 5,610,898 ("*Takimoto*") or US 2003/0049381 ("*Mirkin*") is respectfully traversed.

Applicants' claims 54, 64, and the associated dependent claims specify that the tip and the beam are different materials. Conversely, present claims 70, 72, and the associated dependent claims permit the tip and beam to be made from the same material. However, these claims specify non-polymeric materials and specific polymers, such as elastomers, siloxanes, imides, and parylenes, which are not the epoxy-based photoresists taught by *Andreoli*. The methods of *Andreoli* and *Takimoto* cannot provide SPM probes having different or non-photoresist materials in the tip and beam portions. Furthermore, the cited references do not suggest that the fabrication methods of *Andreoli* and/or *Takimoto* would be compatible with the elastomeric stamps described in *Mirkin*.

Andreoli describes a method of making a cantilever and tip as a single unit from a single photoresist material. (Abstract). To this combination tip-cantilever, a thicker block of the same photoresist material is added to provide a mounting section. (Col. 4, Lines 27-32). The photoresist material is epoxy based. (Col. 3, Lines 38-40).

Takimoto describes a recording head where the tip and beam are made of the same materials, *i.e.* tungsten and gold metal (Col. 13, Lines 63-65), or where the tip is made from a combination of metals, *i.e.* Si and Au, while the beam is made from an oxide SiO₂. (Col. 6, Lines 44-48). When the tip and beam are both metals, they are glued together. (Col. 13, Lines 66-67). When the tip includes Si, it is “grown” from the SiO₂ beam and then coated with Au. (Col. 6, Lines 44-48).

Mirkin describes methods of using SPM tips to perform “dip pen” nanolithography with pre-purchased AFM tips having hollow regions that trap the patterning compounds. (Abstract; Para. [0053]). This reference also describes that elastomer stamps can be used in a different, but parallel technique for nanolithography. (Para. [0007]).

Andreoli only suggests using a single photoresist material for the tip and beam because the described method forms the tip and beam from the same layer. Thus, *Andreoli* does not suggest a SMP probe or method of making a SMP probe where the tip and beam are non-photoresist or different materials. *Andreoli* in combination with *Takimoto* cannot suggest Applicants’ constructions because *Takimoto’s* methods of forming recording heads, such as gluing Au leaf to a tungsten point or growing a Si crystal on SiO₂, are incompatible with Applicants’. Unlike *Takimoto’s*, Applicants’ methods are based on the application and selective removal of layers.

Andreoli in combination with *Mirkin* also fails to suggest Applicants’ construction. The method of *Andreoli* is directed to photoresist materials and the teachings lack any motivation to replace the photoresist with the elastomers appropriate for the stamps described in *Mirkin*. Furthermore, *Andreoli* provides no suggestion that the photoresist could be successfully replaced with an elastomer appropriate for stamps. Neither does suggest that an elastomeric material would possess the characteristics required for a probe. In fact, *Mirkin*

teaches away from elastomeric probes since the elastomers are used in a different, stamp-based technique. Thus, the cited references cannot suggest that such an elastomeric probe could be successfully made using the methods of *Andreoli* or that it should be. As such, the rejections under 35 USC § 102 & 103 should be withdrawn.

Claim 44 and the associated dependent claims specify that a handle is formed on an adhesion layer. *Andreoli*, *Takimoto*, and *Mirkin* have been described above. While *Takimoto* describes using an adhesive to join a metal tip to a metal beam, each of the references fail to describe the use of an adhesive island to bond Applicants' structural layer, which may serve as a beam, to a handle. Thus, the invention of these claims cannot be anticipated or obvious over the cited reference and the rejections should be withdrawn.

The 35 U.S.C. § 112 Rejections are Moot

Claims 44-45 and 54 were rejected under 35 U.S.C. § 112, first or second paragraph. As suggested by the Examiner, claims 54 and 55 now specify a sacrificial layer between the substrate and structural layer. Claims 44, 45, and 54 now specify selectively removing the sacrificial layer and releasing the structural layer from the substrate. The rejection under § 112 is now moot and withdrawal of the rejection is respectfully requested.


Conclusion

The Applicants believe the Examiner's concerns have been addressed to overcome the rejections. Upon the indication of allowable subject matter, Applicants respectfully request that Examiner Leybourne contact the undersigned at the number below to expedite issuance of this case.

Respectfully submitted,

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